

## CLAIMS

What is claimed is:

- 5 1. A flow-through capacitor system comprising a plurality of flow-through capacitor cells, each of said plurality of cells in electrical communication with a charge cycle sequence controller.
2. The flow-through capacitor system of claim 1, further comprising a plurality of current collectors and a flow spacer are shared among said plurality of 10 current collectors.
3. The flow-through capacitor system of claim 1, which is operated such that multiple concentration bands exist simultaneously within a given material layer.
4. The flow-through capacitor system of claim 1, further comprising a conductivity controlled valve between at least two of said plurality of current 15 collectors.
5. The flow-through capacitor system of claim 1, further comprising a flow stream parallel to at least two of said plurality of current collectors, with continuous purification and concentration streams directed to separate collection paths.
6. The flow-through capacitor system of claim 4, wherein fluid is manipulated 20 to form adjacent purification and concentration streams that may be separately collected without need for a valve.
7. The flow-through capacitor system of claim 1, wherein valves are individually triggered with charge cycles in order to produce a purified product stream.
- 25 8. The flow-through capacitor system of claim 1, wherein said flow-through capacitor system has a staging efficiency of 50% or more.

9. The flow-through capacitor system of claim 2, wherein said flow-through capacitor system has a power efficiency of 50% or more.
10. The flow-through capacitor system of claim 1, wherein the charge cycles of individual cells are synchronized to correspond with the arrival of a segment of purified water traveling in serially through multiple cells.
11. The flow-through capacitor system of claim 1, wherein voltage is incremented in a step wise fashion as cells are sequentially powered by adding them in series.
12. The flow-through capacitor system of claim 1, wherein cells are powered by sequentially switching them together in parallel.
13. The flow-through capacitor system of claim 1 whereby the voltage varies along the flow path.